MtronPTI

...when timing matters

RoHS Compliant

Introduces

M6001/M6002 SERIES TCXO

and

M6003/M6004 SERIES VCTCXO

- Operating stabilities to ± 0.5 ppm
- Stratum III stability of ±4.6 ppm (non-holdover) over an operating temperature of -40°C to +85°C for ten years
- 3.3 V or 5.0 V operating voltage
- Ideal for Signal Processing, Military/Avionic Communications, Flight Controls, WLAN, Basestations, DWDM, SERDES, SONET/SDH, 10G and 40G Ethernet Applications

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APPLICATION INFORMATION

M6001, M6002, M6003 & M6004 Series

9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO

MtronPTI is one of the first companies to introduce a family of low voltage, surface mount TCXO's and VCTCXO's (voltage controlled TCXO) that are designed to provide network and wireless engineers with products that offer tight stability and excellent aging characteristics. The M6001-6004 Series utilizes hermetically sealed crystals, along with a "low-aging" process, to achieve consistent, long-term stability and minimal frequency shift in the customer's application after re-flow. With this process, a first year aging rate of less than 1 ppm is achievable. A stability of ± 0.5 ppm over 0°C to +70°C is available as well as stabilities ranging from ± 1 ppm to ± 4.6 ppm over -40°C to +85°C.

A special version (L-stability option) of the M6001-6004 is available for Stratum 3 applications. MtronPTI's unique approach to crystal compensation enables these devices to achieve Stratum 3 stability (± 4.6 ppm) from -40°C to 85°C. The low phase noise (-143 dBc/Hz @ 10 kHz) make the M6001-6004 ideal for those design engineers working on high data-rate, low BER data communication network products.

The M6001/M6002 (3.3 V and 5 V TCXO) and M6003/M6004 (3.3 V and 5 V VCTCXO) are ideally suited for a wide range of applications such as: SONET, SDH, SERDES, and PCS base stations; point to point/multi-point radios; WDM systems; Gig-Ethernet; 10G and 40G systems; test and measurement; frequency synthesis; frequency translation; specialized mobile radio, and WLAN. Standard output for the M6001-6004 series is HCMOS compatible and draws as little as 4 mA with a 3.3 volt supply at 19.440 MHz frequency. This low power consumption provides an advantage over similarly specified ovenized oscillators for power-sensitive applications.

Customers can order product with or without the tristate feature. The M6003-6004 series offers ±10 ppm minimum pull range with excellent tuning linearity performance for critical PPL applications. These products are available in frequencies from 5 to 30 MHz, and can be offered in a surface mount FR-4 based platform with industry standard 9 x 14 mm footprint. Contact the factory for 14 pin DIP configuration.

M6001, M6002, M6003 & M6004 Series

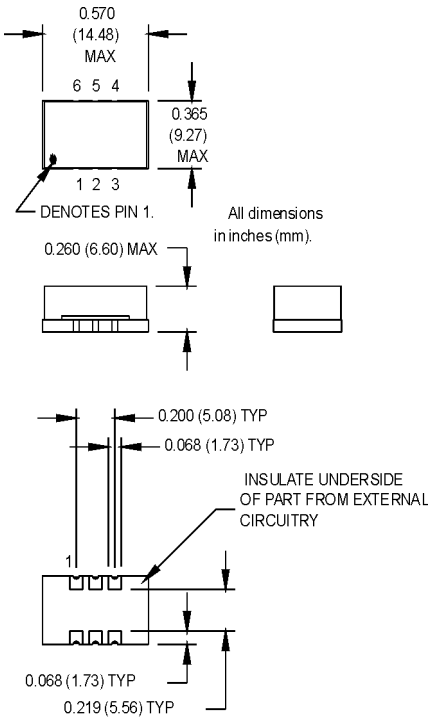
9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO

Features:

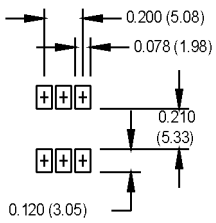
- Operating stabilities to ± 0.5 ppm
- Stratum III stability of ± 4.6 ppm (non holdover)

Applications:

- Ideal for Signal Processing, Military / Avionic Communiations, Flight Controls, WLAN, Basestations, DWDM, SERDES, SONET / SDH, 10G and 40G Ethernet applications.



SUGGESTED SOLDER PAD LAYOUT



Ordering Information

M6001 - M6004 | 1 | L | F | C | K | -R

Product Series
- **M6001** = 3.3 V TCXO
- **M6002** = 5.0 V TCXO
- **M6003** = 3.3 V VCTCXO
- **M6004** = 5.0 V VCTCXO

Temperature Range
- **1:** 0°C to +70°C
- **2:** -40°C to +85°C
- **8:** 0°C to +50°C

Stability
- **L:** ± 4.6 ppm
- **K:** ±2 ppm
- **J:** ± 1 ppm
- **G:** ± 0.5 ppm (0° to 50°C only)

Frequency Control (Pin #1)
- **F:** Fixed (M6001 and M6002 only)
- **V:** Voltage Controlled (M6003 and M6004 only)

Symmetry/Logic Compatibility
- **C:** 45/55% CMOS

Package/Lead Configurations
- **K:** FR-4 6 pad
- **D:** DIP (contact factory)

RoHS Compliant
- **R:** RoHS Compliant
- **Blank:** Non-RoHS

Pin Connections

FUNCTION	PAD
N/C or Control Voltage	1
Tristate	2
Ground/Case	3
Output	4
N/C	5
+Vdd	6

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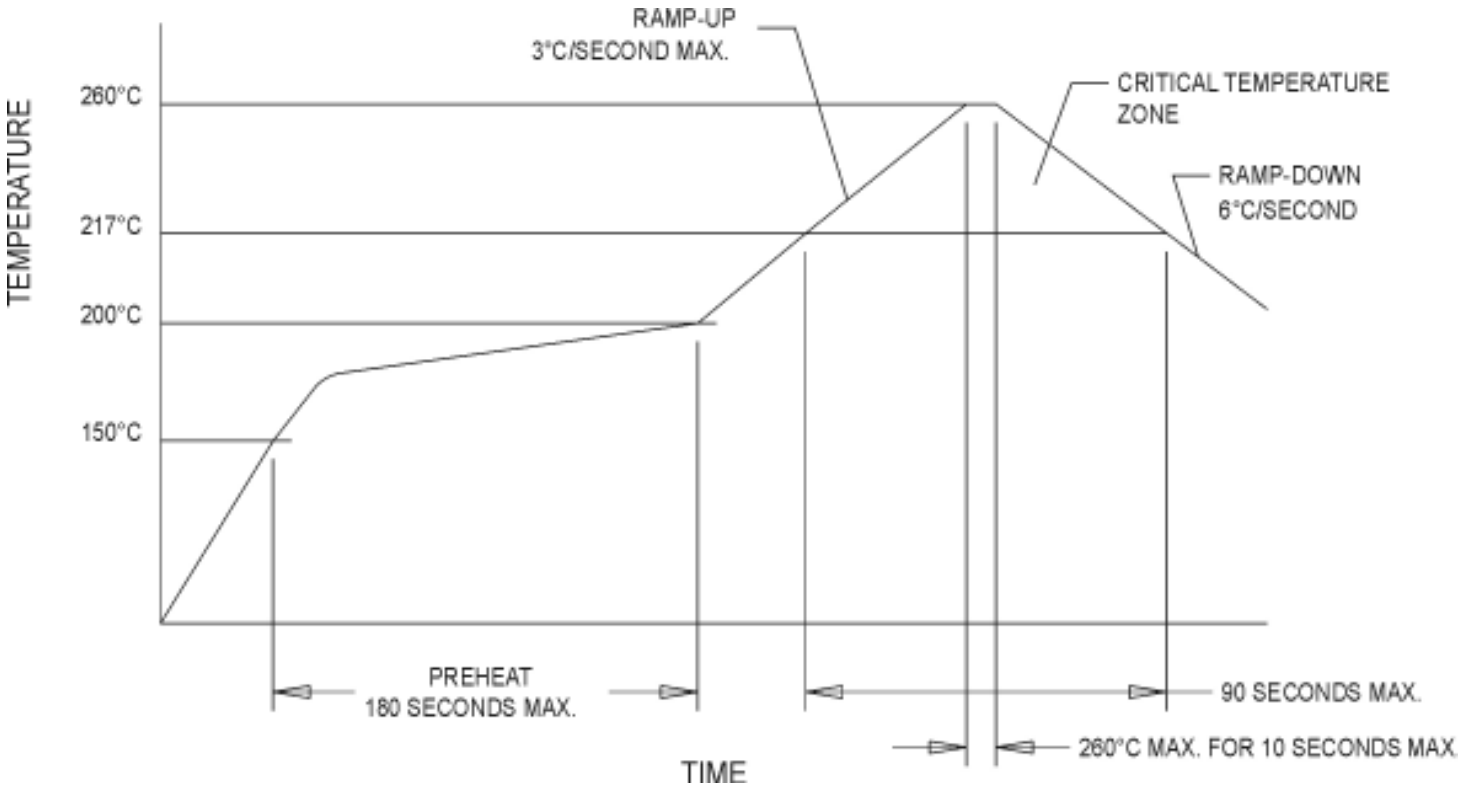
9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO

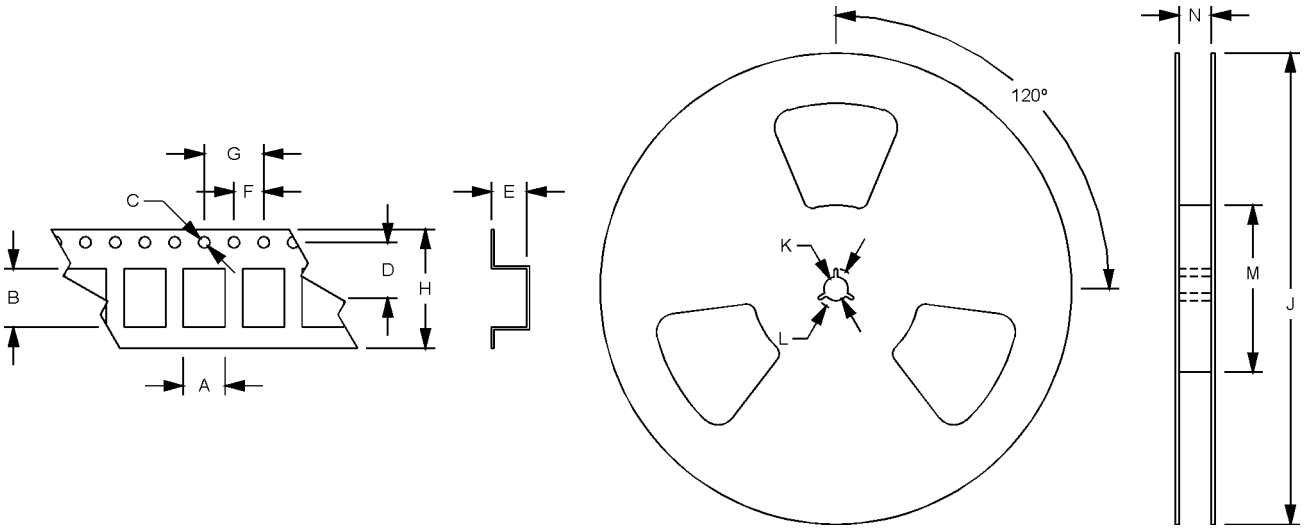
Electrical Specifications	PARAMETER	Symbol	Min.	Typ.	Max.	Units	Condition/Notes
	Frequency Range	F	5		30	MHz	
	Operating Temperature	T_A	(See Ordering Information)				
	Storage Temperature	T_S	-55		+105	°C	
	Frequency Stability		(See Ordering Information)				See Note 1
	Aging **1st Year** **10 year aging**				 1.0 3.0	 ppm ppm	See Note 2
	Input Voltage	Vdd	3.15	3.3	3.45	V	M6001, M6003
			4.75	5.0	5.25	V	M6002, M6004
	Input Current	Idd			10	mA	M6001, M6003
					20	mA	M6002, M6004
	Pullability		±10			ppm	M6003/M6004 only (positive slope)
	Control Voltage	Vc	0.5	1.5	2.5	V	M6003/M6004 only
	Modulation Bandwidth	fm	10			kHz	M6003/M6004 only
	Input Impedance	Zin	50k			Ohms	M6003/M6004 only
	Output Type						CMOS
	Load			15		pF	
	Symmetry (Duty Cycle)		(See Ordering Information)				
	Logic "1" Level	Voh	90 %			Vdd	
	Logic "0" Level	Vol			10%	Vdd	
	Rise/Fall Time	Tr/Tf			3	ns	
	Tristate Function		Input Logic "1": output active Input Logic "0": output disables				
	Start up Time		10			ms	
	Phase Noise (Typical) **@19.44 MHz**	**10 Hz** -77	**100 Hz** -107	**1 kHz** -128	**10 kHz** -143	**100 kHz** -148	**Offset from carrier**

1. Stability is inclusive of initial calibration, temperature, reflow, supply, load, shock, vibration, and ten year aging at 55°C.
2. "L" stability version only. All other stability options - initial calibration and deviation vs. temperature.

Solder Profile:



Tape and Reel Specifications:



Product	A	B	C	D	E	F	G	H	I	J	K	L
M6001 – M6004	6.51	9.29	1.5	7.5	2.8	4	8/12	16	180-330	13	21	60-100

M6001, M6002, M6003 & M6004 Series

9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO

Quality Parameters:

Environmental Specifications/Qualification Testing Performed on the M6001 - M6004 Series		
Test	**Test Method**	**Test Condition**
Electrical Characteristics	Internal Specification	Per Specification
Frequency vs. Temperature	Internal Specification	Per Specification
Mechanical Shock	MIL-STD-202, Method 213, C	100 g's
Vibration	MIL-STD-202, Method 201-204	10 g's from 10-2000 Hz
Thermal Cycle	MIL-STD-883, Method 1010, B	-55 Deg. C to +125 Deg. C, 15 minute Dwell, 10 cycles
Aging	Internal Specification	168 Hours at 105 Degrees C
Gross Leak	MIL-STD-202, Method 112	30 Second Immersion
Fine Leak	MIL-STD-202, Method 112	Must meet $1x10^{-8}$
Solderability	MIL-STD-883, Method 2003	8 Hour Steam Age – Must Exhibit 95% coverage
Resistance to Solvents	MIL-STD-883, Method 2015	Three 1 minute soaks
Terminal Pull	MIL-STD-883, Method 2004, A	2 Pounds
Lead Bend	MIL-STD-883, Method 2004, B1	1 Bending Cycle
Physical Dimensions	MIL-STD-883, Method 2016	Per Specification
Internal Visual	Internal Specification	Per Internal Specification

Handling Information:

Although protection circuitry has been designed into the M6001 - M6004 Series, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode. Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500, capacitance = 100 pF) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters.

Model	ESD Threshold, Minimum	Unit
Human Body	1500*	V
Charged Device	1500*	V

* MIL-STD-833D, Method 3015, Class 1

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